

ABSTRACT

An integrated propulsion and guidance system for a vehicle includes an engine coupled to an impeller via a driveshaft to produce propulsive force. The impeller includes a hub and a plurality of blades, including at least one control blade pivotably mounted to the hub. A control system provides a control signal to a magnetic actuator to adjust the blade pitch of the control blades as the blades rotate about the hub. The magnetic actuator provides an electromagnetic field that interacts with a magnet coupled to the control blade to adjust the pitch of the control blade. The change in blade pitch produces a torque on the driveshaft that can be used to control the heading of the vehicle. By varying the magnitude and phase of the control signal provided to the impeller, the torque can be applied in a multitude of distinct reference planes, thereby allowing the orientation of the vehicle to be adjusted through action of the impeller. Moreover, because the control blades are actuated magnetically, mechanical linkages between the impeller and the blade control motor may be eliminated.